

# Proceedings of the Iowa Academy of Science

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Volume 48 | Annual Issue

Article 91

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1941

## An Electrical Circuit Designed for Use in a Calculating Instrument (Abstract)

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### Recommended Citation

Wendland, Ray (1941) "An Electrical Circuit Designed for Use in a Calculating Instrument (Abstract)," *Proceedings of the Iowa Academy of Science*, 48(1), 310-311.  
Available at: <https://scholarworks.uni.edu/pias/vol48/iss1/91>

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INTERPRETATION OF VARIATION OF PARTIAL MOLAL  
VOLUME OF THE SOLUTE WITH AQUEOUS SOLUTIONS  
OF STRONG ELECTROLYTES

(ABSTRACT)

G. W. STEWART

One view is that the variation in the partial molal volume of water is produced by a change in its structure from a four-coordinated to a higher one. This view receives corroboration from experiments with the x-ray diffraction pattern of aqueous ionic solutions of thirty-one strong electrolytes. The results show a correspondence between the rate of variation of (1) the partial molal volume with concentration of the electrolyte; and (2) the liquid structure of the water also with concentration.

STATE UNIVERSITY OF IOWA,  
IOWA CITY, IOWA.

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RIGIDITY MODULUS OF LEAD SINGLE CRYSTALS

(ABSTRACT)

IRVIN H. SWIFT

The isothermal rigidity modulus has been measured for lead crystals of various orientations. The reciprocal bending-torsion effect and its influence on the measurement are considered.

STATE UNIVERSITY OF IOWA,  
IOWA CITY, IOWA.

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AN ELECTRICAL CIRCUIT DESIGNED FOR USE IN A  
CALCULATING INSTRUMENT

(ABSTRACT)

RAY WENDLAND

Mathematical analysis of the potential variation produced by a circuit comprising two slide wire resistors (potentiometers) linked in parallel revealed the possibility of compensating the circuit so as to provide a potential varying as the product of the resistances in the individual slide wires. The problem was to counteract the fall in potential produced when a resistor is placed across a potentiometer circuit delivering an initial potential,  $E_0$ .

It was shown in the main report that a compensating resistor with the following characteristics would solve the problem, namely,

$$R_x = \frac{R_1^2}{R_2 - R_1}$$

in which  $R_1$  is the resistance operating in the first slide wire,  $R_2$  is the *total* resistance of the second slide wire, and is therefore, a constant, and  $R_x$  is the value of the required compensator.

A suitable manner of constructing  $R_x$  was devised, with the result that when the two slide wires described are manipulated independently of each other, the output potential of the circuit varies directly as the product of the operating resistances in the slide wires.

With this relationship it is possible to apply appropriate scales to the slide wire resistors, balance the output potential using a suitable measuring instrument, and hence to adapt the circuit to the type of mathematical operations involving multiplication and division.

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## A PRECISE METHOD FOR DETERMINING THE EFFICIENCY OF ELECTRIC RANGE UNITS

(ABSTRACT)

MARGARET WOODROW

The methods generally employed for determining the efficiency of electric range units do not account for the heat losses through the sides of the testing utensil and, sometimes, that lost through evaporation. Consequently, these determinations give too low a value for the efficiency of the units. By designing and using a vessel for which the heat losses could be accurately measured, the efficiencies of different types of units were determined. The efficiencies obtained by this method were considerably higher and more uniform than those determined by the usual methods.

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